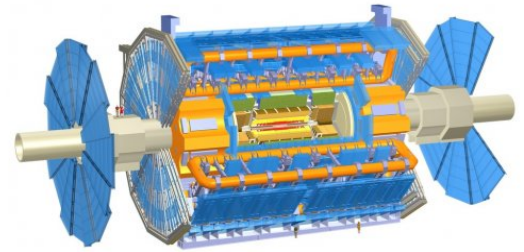# Evolving the ATLAS Computing Model

The ATLAS computing model has now been tested with cosmic rays and beam-related data (described elsewhere). The overall 3-tier model remains as in the Technical Design Report (2005), although important practical lessons have been learned.

The ATLAS detector

Data Organization:
o **The data is now not just streamed for analysis, but as it leaves the trigger system. The streams are defined by trigger types and are immutable.**
o **The data is also split into fixed luminosity blocks.**
o **Collections of files of similar data are grouped into datasets.**
o **As well as full reconstruction output (ESD) & the physics analysis format (AOD), reduced versions (DPD) are very important for sub-groups.**
o **ATLAS make full use of space tokens as the only effective means of applying quotas and reserving space for distinct classes of data. Access is controlled by VOMS group & role.**

Simulation:
o **The required physics performance & detailed geometry means the simulation is slower than expected**
o **Tier 1s help with the simulation until the real data takes all the resource**
o **An intermediate simulation mode (Atlfast2) between fast and full simulation has become increasingly important**

CERN Facilities:
o **Required data throughput required more disk servers and more disk than in TDR**
o **Must step in for reprocessing when problems with large Tier 1 sites**
o **Calibration & alignment needs at CERN larger than predicted**

Tier 1 Facilities:
o **Tier 1s keep & reprocesses data**
  o **Disasters happen & downtimes inevitable**
  o **It is rare for all Tier 1s to be fully up**
o **Tier 1s have associated Tier 2 cloud**
  ➤ **They receive their simulated data**
  ➤ **They distribute the analysis data**
o **Only group 'power users' allowed on Tier 1 facility**
o **Some Tier 1s have analysis facilities co-hosted at the same site**
  ➤ **Users must not disrupt the Tier 1 function, especially the SRMs**
o **If a Tier 1 has too few Tier 2s, a Tier 2 at the Tier 1 site helps to re-balance**
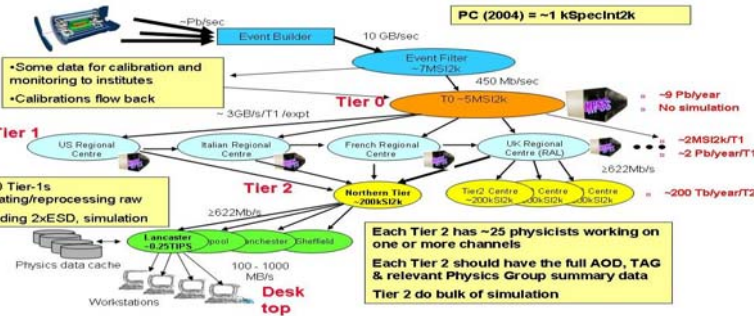
Tier 2 Facilities:
o **Managing user data on the Grid remains a challenge**
  o **User quotas are not possible**
    ➤ **Scratch space for user jobs**
    ➤ **Group space allocated using space tokens (group managed)**
    ➤ **'Tier 3' space on Tier 2s in some clouds (locally managed)**
o **Tier 2s must enable limited reprocessing**
  o **Effective database access methods developed**
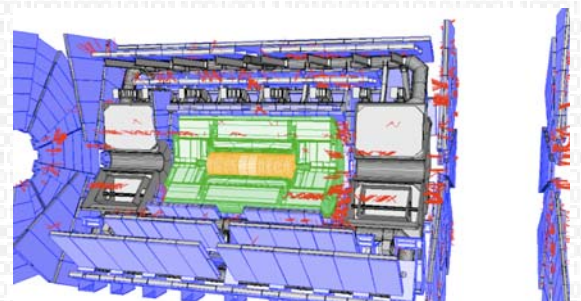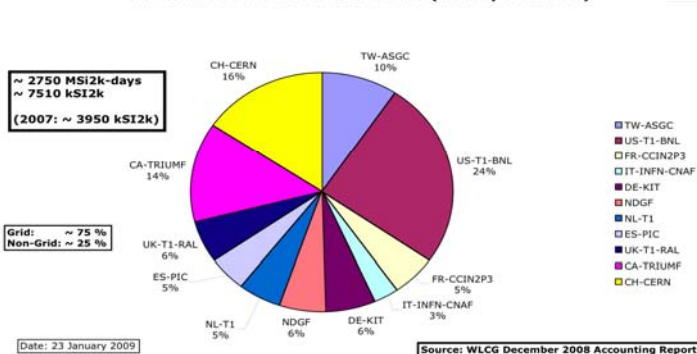
Authors:
o**Roger Jones (Roger.Jones@lancaster.ac.uk**
o**Dario Barberis (Dario.Barberis@cern.ch)**